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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/805,590

03/19/2004

Larry E. Hand

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LAW OFFICES OF MARK L. BERRIER
3811 BEE CAVES ROAD
SUITE 204
AUSTIN, TX 78746

EXAMINER

SELLERS, DANIEL R

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/805,590	Applicant(s) HAND ET AL.	
	Examiner DANIEL R. SELLERS	Art Unit 2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 8-14 is/are rejected.
- 7) ☒ Claim(s) 3-7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 8 and 14** are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Cory et al., US 7,099,426 B1 (hereinafter Cory).

3. Regarding **claim 8**, Cory teaches a method comprising:

*determining a difference between values of a read pointer and a write pointer in each of a plurality of buffers (column 18, line 61 - column 19, line 6 and column 22, lines 34-40);
controlling reads from a first one of the buffers to drive the difference between the corresponding read and write pointers to a predetermined value (column 19, lines 7-23); and
controlling reads from each of the remaining buffers to drive the difference between the corresponding read and write pointers to the difference between the read and write pointers of the first buffer (column 29, lines 56-66).*

4. Regarding **claim 14**, see the preceding argument with respect to claim 8. Cory teaches a system with these features.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. **Claims 1, 2, 8, 10-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda et al., US 2002/0122518 A1 (hereinafter Yasuda) further in view of Cory.

8. Regarding **claim 1**, Yasuda teaches a multi-channel audio amplifier system (§ 0011) comprising:

a plurality of audio amplifier channels (§ 0025 and § 0027), wherein each channel includes a sample rate converter (§ 0026, figure 1, units 110, 120, and 130, and figure 2) configured to
receive samples of an input audio data stream (§ 0028 and figure 1, unit 1),
store the samples in an input buffer, retrieve samples from the input buffer (§ 0036-0037 and figure 2, unit 13), and
convert the samples to a re-sampled audio data stream (§ 0039 and figure 2, unit 21), and
a buffer management unit coupled to the input buffer (§ 0041 and figure 2, unit 25) and configured to maintain
a write pointer indicating a position in the input buffer to which a next sample will be written (§ 0041) and
a read pointer indicating a position in the input buffer from which a next sample will be read (§ 0041),
wherein the buffer management unit is configured to determine an actual difference between the values of the read and write pointers (§ 0043),
wherein the buffer management unit is further configured to control reads from the input buffer to achieve a target difference between the values of the read and write pointers (§ 0049);

*wherein for a first one of the channels, the target difference comprises a predetermined value;
and
wherein for the remainder of the channels, the target difference comprises the actual difference
between the values of the read and write pointers of the first one of the channels.*

Yasuda teaches a PWM, or class-D, amplifier for use in a multi-channel system, wherein a controller directs the read and write pointers in several channels (see figure 1, units 101, 110, 120, and 130). Yasuda however does not disclose the features of a target difference for a first of the several channels, and an actual difference equal to the target difference for the remainder of the channels.

Cory teaches a method for synchronizing plural channels in an elastic buffer, or FIFO memory (column 1, lines 12-52, column 2, line 62 - column 3, line 16, and column 4, line 20 - column 5, line 14). Cory does not teach audio data, however it would have been obvious at the time of the invention for one of ordinary skill in the art to contemplate the usefulness of this FIFO buffer control, because Yasuda also teaches FIFO buffers, or ring buffers. Specifically, Cory teaches controlling the read pointer to achieve a target difference for a first one of the channels (column 19, lines 7-23), controlling the read pointers of the slave buffers based on the actual difference in the master buffer (column 29, lines 56-66). It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Yasuda and Cory for the purpose of synchronizing the plural channels and reducing misalignment of the audio data

9. Regarding **claim 2**, the combination teaches the system of claim 1, further comprising these features. It is implicit there is an interconnect to convey the actual

difference between the first channel and the remainder channels as taught by the master-slave method by Cory.

10. Regarding **claim 8**, see the preceding argument with respect to claim 1. The combination of Yasuda and Cory teaches these features.

11. Regarding **claim 10**, see the preceding argument with respect to claim 1. The combination teaches the method of claim 8, wherein the method is implemented in a plurality of sample rate controllers.

12. Regarding **claim 11**, see the preceding argument with respect to claim 1. The combination teaches the method of claim 10, wherein the buffers comprise input buffers of the sample rate controllers.

13. Regarding **claim 12**, see the preceding argument with respect to claim 1. The combination teaches the method of claim 10, wherein each sample rate controller is implemented in a channel of a multi-channel audio amplification system. Yasuda teaches each sample rate controller converts two channels, and illustrates in figure 1, three separate controllers for six channels of audio. It would have been obvious to separate each controller to handle one channel individually and double the components so that six controllers convert six channels.

14. Regarding **claim 13**, see the preceding argument with respect to claim 1. The combination teaches the method of claim 8, further comprising transmitting the difference between the read and write pointers of the first one of the buffers from a buffer management unit in the first one of the buffers to buffer management units in the remainder of the buffers (see Cory, column 22, lines 25-40 and column 29, lines 56-66).

15. Regarding **claim 14**, see the preceding argument with respect to claim 1. The combination teaches a system comprising these features.

16. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Yasuda and Cory as applied to claim 8 above, and further in view of Cooke, US 7,302,396 B1.

17. Regarding **claim 9**, see the preceding argument with respect to claim 1. The combination teaches the method of claim 8, wherein the method is implemented in a multi-channel audio amplification system. The combination teaches these features, however does not explicitly state the convolution operation uses polyphase filter coefficients (Yasuda, ¶ 0067-0068).

In a related art, Cooke teaches the use of an input buffer in a sample rate conversion system (abstract and figure 4). Specifically, Cooke teaches the use of polyphase filter coefficients (column 5, line 58 - column 6, line 10). It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Yasuda, Cory, and Cooke for the purpose of producing higher quality audio. Cooke teaches the polyphase filter coefficients produce output data approximating signal characteristics of input data as if it had originally been sampled at the resampled rate (column 6, lines 1-3).

Allowable Subject Matter

18. **Claims 3-7** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

19. Regarding **claim 3**, see the preceding argument with respect to claim 1 under 35 USC 103, wherein the combination teaches the features of claim 1. However, the prior art does not appear to teach a phase selection unit coupled to the buffer management unit, wherein the phase output signal controls reads from the input buffer.

20. Regarding **claims 4-7**, see the preceding argument with respect to claim 3. These claims depend from claim 3, wherein the prior art does not appear to teach the features of claim 3.

Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Curtis et al., US 6,389,139 B1 - teaches a network audio system using in a serial connection (see figure 7);

O'Brien, US 6,429,737 B1 - teaches a multi-channel audio amplifier using PWM amplification and utilizing a global system timing (abstract and figure 1, unit 123 and 124);

Midya, US 2003/0042976 A1 - teaches a PWM amplification system using sample rate converters (see figures 1 and 8); and

Stanley, US 6,683,494 B2 - teaches another PWM amplification system using a master-slave clock system (see figure 1, units 18 and 30, figure 4, units 18, and 232, and column 10, lines 51-60).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL R. SELLERS whose telephone number is (571)272-7528. The examiner can normally be reached on Monday to Friday, 9am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on (571)272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel R. Sellers/

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Examiner, Art Unit 2615

/Sinh N Tran/

Supervisory Patent Examiner, Art Unit 2615